What I claim is:

1. In an ion implanter apparatus including a source for the generation of charged particles as a continuous ion beam, means for directing the continuous ion beam in a desired direction, and a plane surface for the implantation of charged particles in the continuous ion beam into a prepared workpiece, the improvement of an electromagnetic regulator assembly for adjusting and controlling the uniformity of charged particles in a continuous ion beam, said regulator assembly comprising:

a multipole coil array comprised of

(i) a straight support rod comprising ferromagnetic material and having a predetermined length and girth, and

(ii) at least two wire coils disposed individually, orthogonally, and adjacently at pre-chosen sites on said support rod, each of said wire coils being formed of electrically conductive matter;

a boundary plate presenting a planar surface which is positioned to lie parallel to and at a preset gap distance from said multipole coil array, said boundary plate being of predetermined dimensions and configuration and comprising ferromagnetic material;

means for introducing electrical energy individually to each wire coil disposed on said support rod;

an electric current controller for the independent adjustment and control of the electrical energy introduced individually to each wire coil disposed on said support rod of said array, whereby each energized wire coil generates an orthogonally extending and current adjusted magnetic field gradient of limited breadth, and whereby a plurality of said orthogonally extending and current adjusted magnetic field gradients of limited breadth collectively form a

contiguous magnetic field having a customized magnetic field gradient, and whereby the application of said customized magnetic field gradient of said contiguous magnetic field will increase the uniformity of charged particles in a continuous ion beam; and

a circumscribed spatial passageway for applying said contiguous magnetic field having a customized magnetic field gradient to a continuous ion beam traveling therethrough, wherein said spatial passageway is dimensionally circumscribed in an x-axis direction by the length of said multipole coil array and in a y-axis direction by a preset gap distance separating said multipole array from said plane surface of said boundary plate, and wherein the degree of uniformity for the charged particles of a continuous ion beam becomes increased.

2. In an ion implanter apparatus including a source for the generation of charged particles as a continuous ion beam, means for directing the continuous ion beam in a desired direction, and a plane surface for the implantation of charged particles in the continuous ion beam into a prepared workpiece, the improvement of an electromagnetic regulator assembly for adjusting and controlling the uniformity of charged particles in a continuous ion beam, said regulator assembly comprising:

a first multipole coil array comprised of

(i) a straight support rod comprising ferromagnetic material and having a fixed length and girth, and

(ii) at least two wire coils wound independently and positioned adjacently at pre-chosen sites on said support rod, each of said wire coils being formed of electrically conductive matter and being wound to lie orthogonal to said straight support road;

a second multipole coil array which is positioned parallel to, is in correspondence with

the wire coils of, and lies at a preset gap distance from said first multipole coil array, said second multipole coil array being comprised of

(ϒ) a straight support rod comprising ferromagnetic material and having a fixed length and girth, and

(ύ) at least two wire coils wound independently and positioned adjacently at pre-chosen sites on said support rod, each of said wire coils being formed of electrically conductive matter and being wound to lie orthogonal to said straight support road;

on-demand means for passing electrical energy of variable current independently and concurrently through each adjacently positioned wire coil on said each of said support rods of said first and second multipole arrays, whereby each adjacently positioned and energized wire coil independently and concurrently generates an orthogonally extending and individually adjustable magnetic field gradient of limited breadth between said first and second multipole coil arrays, and whereby said plurality of adjacently extending magnetic field gradients of limited breadth collectively form a contiguous magnetic field between said first and second multipole coil arrays, and whereby each magnetic field gradient of limited breadth within said contiguous magnetic field can be individually and concurrently altered at will to yield an adjustable and controllable magnetic field gradient over said contiguous magnetic field;

a circumscribed spatial passageway existing between said first and second multipole coil arrays for applying a contiguous magnetic field to and adjusting and controlling the magnetic field gradient of an applied contiguous magnetic field for a continuous ion beam traveling therethrough, wherein said spatial passageway is dimensionally circumscribed in a x-axis direction by the length of said first and second multipole coil arrays, and in a y-axis direction by said preset gap distance separating said first multipole coil array from said second multipole coil

array, and wherein the degree of uniformity for the charged particles of a continuous ion beam becomes adjusted and controlled.

3. The regulator apparatus as recited by claim 1 or 2 wherein said continuous ion beam is a ribbon-shaped beam.

4. The regulator apparatus as recited by claim 1 or 2 wherein the number of said wire coils wound independently and positioned adjacently at pre-chosen sites on a support rod ranges between four and thirty.

5. The regulator assembly recited by claim 1 or 2 further comprising a means of measuring the profile of the current density of the ion beam in its long dimension at the plane where the workpiece is to be implanted, by measuring the current at a plurality of positions including those positions having the same x-coordinates as each of the coils of the multipole array, said measuring means extending beyond the beam edges in its narrow dimension but being restricted in the direction of the large dimension of the ion beam to less than the width of one of the coils in the multipole coil arrays.

6. The regulator assembly as recited by claim 5 wherein the means of passing variable electrical current are adjusted in response to the measurement of the current density profile, so as to modify the observed ion beam current density profile at the corresponding location in the target plane until that current density conforms to a desired profile.

7. The regulator apparatus as recited by claim 1 or 2 wherein the current introduced to said wire coils of said multipole coil array ranges from 50 to 10,000 ampere turns.

8. The regulator apparatus as recited by claim 1 or 2 wherein said preset gap distance of said spatial passageway is a dimension varying from 25 to 250 millimeters.

9. The regulator apparatus as recited by claim 1 or 2 wherein said breadth dimension of said spatial passageway varies from 200 to 2,000 millimeters.

10. A method for adjusting and controlling the uniformity of charged particles in a continuous ion beam, said method comprising the steps of:

obtaining a regulator assembly comprised of

a multipole coil array comprised of

(i) a straight support rod comprising ferromagnetic material and having a predetermined length and girth, and

(ii) at least two wire coils wound independently and positioned adjacently at pre-chosen sites on said support rod, each of said wire coils being formed of electrically conductive matter and being wound to lie orthogonal to said straight support road,

a boundary plate presenting a planar surface which is positioned to lie parallel to and at a preset gap distance from said multipole coil array, said boundary plate being of predetermined dimensions and configuration and comprising ferromagnetic material,

on-demand means for passing electrical energy of variable current independently through each adjacently positioned wire coil on said support rod such that each adjacently

positioned and energized wire coil independently is able to generate an orthogonally extending and individually adjustable magnetic field gradient of limited breadth, and said plurality of adjacently extending magnetic field gradients of limited breadth will collectively form a contiguous magnetic field, and each magnetic field gradient of limited breadth within said contiguous magnetic field is able to be individually altered at will to yield an adjustable and controllable magnetic field gradient over said contiguous magnetic field, and

a circumscribed spatial passageway for applying a contiguous magnetic field to and adjusting and controlling the magnetic field gradient of an applied contiguous magnetic field for a continuous ion beam traveling therethrough, wherein said spatial passageway is dimensionally circumscribed in an x-axis direction by said length of said support rod of said multipole coil array and in a y-axis direction by said gap distance separating said multipole array from said plane surface of said boundary plate;

directing a continuous ion beam through said spatial passageway of said electromagnetic regulator assembly;

passing electrical energy of variable current independently through each adjacently positioned wire coil on said support rod, whereby each adjacently positioned and energized wire coil independently generates an orthogonally extending and individually adjustable magnetic field of limited breadth, and whereby said plurality of adjacently extending magnetic fields of limited breadth collectively form a contiguous magnetic field, and whereby each magnetic field of limited breadth within said contiguous magnetic field can be individually altered at will to yield an adjustable and controllable magnetic field gradient over said contiguous magnetic field; and

adjusting and controlling the degree of uniformity for the charged particles of a

continuous ion beam passing through said electromagnetic regular assembly.

11. A method for adjusting and controlling the uniformity of charged particles in a continuous ion beam, said method comprising the steps of:

obtaining a regulator assembly comprised of:

a first multipole coil array comprising

(i) a straight support rod comprising ferromagnetic material and having a fixed length and girth, and

(ii) at least two wire coils wound independently and positioned adjacently at pre-chosen sites on said support rod, each of said wire coils being formed of electrically conductive matter and being wound to lie orthogonal to said straight support road,

a second multipole coil array which is positioned parallel to, is in correspondence with the wire coils of, and lies at a preset gap distance from said first multipole coil array, said second multipole coil array comprising

(ϒ) a straight support rod comprising ferromagnetic material and having a fixed length and girth, and

(ʊ) at least two wire coils wound independently and positioned adjacently at pre-chosen sites on said support rod, each of said wire coils being formed of electrically conductive matter and being wound to lie orthogonal to said straight support road,

on-demand means for passing electrical energy of variable current independently and concurrently through each adjacently positioned wire coil on said each of said support rods of said first and second multipole arrays, such that each adjacently positioned and energized wire coil independently and concurrently is able to generate an orthogonally extending

and individually adjustable magnetic field gradient of limited breadth between said first and second multipole coil arrays, and said plurality of adjacently extending magnetic field gradients of limited breadth collectively form a contiguous magnetic field between said first and second multipole coil arrays, and each magnetic field gradient of limited breadth within said contiguous magnetic field is able to be individually and concurrently altered at will to yield an adjustable and controllable magnetic field gradient over said contiguous magnetic field, and

a circumscribed spatial passageway existing between said first and second multipole coil arrays for applying a contiguous magnetic field to and adjusting and controlling the magnetic field gradient of an applied contiguous magnetic field for a continuous ion beam traveling therethrough, wherein said spatial passageway is dimensionally circumscribed in a x-axis direction by said fixed length of said support rods of said first and second multipole coil arrays, and in a y-axis direction by said preset gap distance separating said first multipole coil array from said second multipole coil array;

directing a continuous ion beam through said spatial passageway of said electromagnetic regulator assembly;

passing electrical energy of variable current independently and concurrently through each adjacently positioned wire coil on said each of said support rods of said first and second multipole arrays, whereby each adjacently positioned and energized wire coil independently and concurrently generates an orthogonally extending and individually adjustable magnetic field of limited breadth between said first and second multipole coil arrays, and whereby said plurality of adjacently extending magnetic fields of limited breadth collectively form a contiguous magnetic field between said first and second multipole coil arrays, and whereby each magnetic field of limited breadth within said contiguous magnetic field can be individually and concurrently

altered at will to yield an adjustable and controllable magnetic field gradient over said contiguous magnetic field; and

adjusting and controlling the degree of uniformity for the charged particles of a continuous ion beam passing through said electromagnetic regular assembly.